

REMARKS

Claims 1-11, 25-40 remain in this application. Claims 18-20 have been cancelled without prejudice. Claim 25 has been amended. Claims 31-40 have been added. The amended and added claims are supported by the specification and no new matter has been added. The Applicants respectfully request reconsideration of this application in view of the above amendments and the following remarks.

Initialization Of IDS References

In the Office Action mailed May 18, 2004, the Examiner pointed out a correction to be made to page 5 of the PTO-1449 form that was initially mailed on January 4, 2002. Applicants politely thank the Examiner for pointing out the error. A corrected version of page 5 is enclosed herewith. Applicants respectfully request that the Examiner indicate that the references listed on page 5 have been considered and made of record by initialing next to each of the references and returning a copy of the initialed page 5 to the Applicant with the next Office Action. The Examiner indicated, in the Office Action mailed May 18, 2004, that these references have already been considered.

35 U.S.C. §112 Rejection

The Examiner has rejected claims 18, 19 and 25 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Without admitting that claims 18 and 19 are indefinite, in order to expedite an early allowance, claims 18 and 19 have been cancelled, without prejudice. New claims 31-32 include similar limitations, and are believed to comply with all of the requirements of 35 U.S.C. §112, second paragraph.

With regard to claim 25, Applicants respectfully disagree with the assertion that the word “distortion” does not occur in the specification. Distortion is used in numerous places in the specification. See e.g., paragraphs [0005], [0007], [0013], [0023], [0024], [0043], [0066], and [0071], for example. Without admitting that the meaning of the phrase “pattern corresponding to the first pattern” is unclear, which it is not believed to be, in order to expedite an early allowance, the phrase has been deleted from claim 25. Accordingly, the Applicants respectfully request that the rejection of claim 25 under 35 U.S.C. §112, second paragraph, be removed.

35 U.S.C. §102(e) Rejection – Cirelli

The Examiner has rejected claims 1-11 and 18-20 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,218,057 issued to Cirelli et al. (hereinafter referred to as “Cirelli”). Applicants respectfully submit that these claims are allowable over Cirelli.

Claim 1 recites “*a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the circuitry feature to reduce a distortion of the circuitry feature*”. Applicants respectfully submit that Cirelli does not teach or reasonably suggest transmitting radiation to a radiation sensitive layer that has already been exposed to radiation.

As discussed in the Abstract of Cirelli, “*a lithographic process for making an article such as a semiconductor device or a lithographic mask is disclosed. In the process, articles are fabricated by a sequence of steps in which materials are deposited on a substrate and patterned. These patterned layers are used to form devices on the semiconductor substrate. The desired pattern is formed by introducing an image of a first pattern in a layer of energy sensitive material. The image is then developed to form a*

first pattern. A layer of energy sensitive material is then formed over the first pattern. An image of a second pattern is then formed in the layer of energy sensitive material formed over the first pattern. The second pattern is then developed [emphasis added]. The desired pattern is then developed from the first pattern and the second pattern.”

As understood by Applicants, the image of the first pattern is *developed* and then a second layer of energy sensitive material is formed over the first pattern. As clearly shown in Fig. 1 of Cirelli, the energy-sensitive photoresist 25 is completely removed, at step 3, which is prior to exposure to radiation to form the image of mask 40, which occurs at step 4.

In the Office Action mailed May 18, 2004, the Examiner seems to have taken the position that claim 1 allegedly does not recite anything about a double exposure prior to development. Applicants respectfully disagree. Claim 1 clearly recites a pattern to modify a **circuitry feature exposed in a radiation sensitive layer** by transmitting modifying radiation according to the pattern to a **region of the radiation sensitive layer containing the circuitry feature** to reduce a distortion of the circuitry feature. The plain language of the claim clearly indicates that the circuitry feature is exposed in the radiation sensitive layer and that the radiation sensitive layer containing the exposed circuitry feature is still present to receive the modifying radiation. Cirelli does not teach or suggest such limitations. In Cirelli, development is used before the image of the second pattern is formed in the layer, and development completely removes the energy-sensitive photoresist 25.

Accordingly, Cirelli does not teach or reasonably suggest a mask comprising a pattern to modify a **circuitry feature already exposed in a radiation sensitive layer** by transmitting modifying radiation according to the pattern to a region of the radiation

sensitive layer containing the circuitry feature to reduce a distortion of the circuitry feature.

Anticipation under 35 U.S.C. Section 102 requires every element of the claimed invention be identically shown in a single prior art reference. The Federal Circuit has indicated that the standard for measuring lack of novelty by anticipation is strict identity. *“For a prior art reference to anticipate in terms of 35 U.S.C. Section 102, every element of the claimed invention must be identically shown in a single reference.”* In *Re Bond*, 910 F.2d 831, 15 USPQ.2d 1566 (Fed. Cir. 1990).

For at least these reasons, **claim 1** is believed to be allowable over Cirelli. **Claims 2-11** depend from claim 1 and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

Independent **claim 25** is believed to be allowable for reasons similar to those discussed above. Dependent **claims 26-30** depend from claim 25, and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

35 U.S.C. §103(a) Rejection – Wang or Capodieci or Inoue

The Examiner has rejected claims 1-11, 18-20, and 25-30 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,544,695 issued to Wang et al. (“Wang”) or U.S. Patent No. 6,044,007 issued to Capodieci (“Capodieci”) or U.S. Patent No. 6,110,647 issued to Inoue et al. (“Inoue”). The Applicants respectfully submit that the present claims are allowable over Wang, Capodieci, and Inoue.

Claim 1 recites at least, *“a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the*

circuitry feature to reduce a distortion of the circuitry feature”. Neither Wang, Capodieci, or Inoue teach or reasonably suggest these limitations.

First, let’s consider Capodieci. As discussed in the Abstract of Capodieci, “a data storage medium contains mask layout data for use in writing a mask includes a first mask data portion which corresponds to a feature having an interior corner. The first mask data portion corresponding to the interior corner includes a multi-level or stepped inner serif in the interior corner [emphasis added] which provides for improved writeability of OPC independent of process push or bias. Alternatively, the data storage medium contains mask layout data which includes a second mask data portion. The second mask data portion corresponds to a feature having an exterior corner and includes a multi-level or stepped outer serif on the exterior corner [emphasis added]. The stepped outer serif also provides for improved writeability of OPC independent of process push or bias”.

Accordingly, Capodieci discusses multi-level or stepped inner or outer serifs. As understood by Applicants, there is no teaching or suggestion that the first mask and the second mask are used together in a double exposure. Accordingly, Capodieci does not teach or suggest a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the circuitry feature to reduce a distortion of the circuitry feature.

Next, let’s consider Wang. As discussed in the Abstract of Wang, “a photomask set and a photolithographic operation suitable for forming a desired pattern on a photoresist layer. The photomask set includes a plurality of photomasks each having a different pattern thereon. To form an overall pattern on the photoresist layer, each photomask is used in turn in a multi-exposure operation”.

As understood by Applicants, Wang does not teach or suggest using a mask having a pattern to reduce a distortion of a circuitry feature **already exposed** in a radiation sensitive layer. Wang does discuss assistant bars, hammerheads, serifs, and jobs (see e.g., column 3, line 63 through column 4, line 14). However, as understood by applicants, the assistant bars, hammerheads, serifs, and jobs **do not modify a feature that has already been exposed** in a radiation sensitive layer. Nor does Wang teach or suggest reducing a distortion of a feature already exposed in a layer.

Finally, let's consider Inoue. As discussed in the Abstract of Inoue, "*a method of manufacturing a semiconductor device, comprises the steps of forming a first transfer pattern corresponding to a mask pattern on a major surface side of a semiconductor substrate through a first mask plate on which the first mask pattern having a straight portion and a bent portion is formed, and forming a second transfer pattern corresponding to a second mask pattern on a major surface side of the semiconductor substrate through a second mask plate on which the second mask pattern having a pattern arranged at a position corresponding to the straight portion is formed*".

As understood by Applicants, Inoue discusses that the first mask pattern and the second mask pattern are formed in different layers instead of in a common radiation sensitive layer. As stated at column 4, lines 40-42, "[t]he wiring pattern 11 and the hole pattern 12 are constituted by **different layers, respectively**". Applicants respectfully submit that, there would presumably be an intermediate development between the exposures in which the layer would be removed before forming the second transfer pattern. Since the masks are used to form patterns in different layers, as understood by Applicants, Inoue does not teach or suggest modifying a circuitry feature **already exposed in a radiation sensitive layer**.

Additionally, Inoue does not teach or suggest that the second transfer pattern corresponding to the second mask be used **to reduce a distortion of a circuitry feature exposed in a radiation sensitive layer.**

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

For the foregoing reasons, Applicants submit that the Examiner has failed to establish a prima facie case of obviousness set forth in MPEP Section 706.02(j). Specifically, the Examiner has failed to show that the prior art references teach or suggest all claim limitations.

For at least these reasons, even without the above amendment, **claim 1** is believed to be allowable over Wang, Capodiec, and Inoue. **Claims 2-11** depend from claim 1 and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

Independent **claim 25** is believed to be allowable for reasons similar to those discussed above. Dependent **claims 26-30** depend from claim 25, and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

Conclusion

In view of the foregoing, it is believed that all claims now pending patentably define the subject invention over the prior art of record and are in condition for allowance. Applicants respectfully request that the rejections be withdrawn and the claims be allowed at the earliest possible date.

Request For Telephone Interview

The Examiner is invited to call Brent E. Vecchia at (303) 740-1980 if there remains any issue with allowance of the case.

Request For An Extension Of Time

The Applicants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17 for such an extension.

Charge Our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,
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